Summary of the annual report 1988-1989

Québec

CRM
CENTRE DE RECHERCHES MINÉRALES

MESSAGE FROM THE DIRECTOR GENERAL

In 1988-1989, the Centre de recherches minérales continued its active efforts to meet the growing technological needs of the mining and mineral industries.

The CRM carried out an increased number of projects sponsored by mining and metallurgical companies, and particular attention was paid to the conception and carrying out of projects aimed at fostering the kinds of expertise that will be needed in the future. As well, technological transfer to the industry was encouraged by several highly successful colloquiums and symposiums.

The number of completed client-sponsored projects rose from 192 in 1987-1988 to 231 in 1988-1989. The average value of this year's projects was $ 15,392. However, the resources and time available for this type of research have probably reached a peak.

Again this year, a large part of the CRM's activity was devoted to the analysis and processing of gold ore and industrial minerals. These activities slowed down toward the end of the year, but other sectors, such as mineral analysis and applied mineralogy, remained fairly strong.

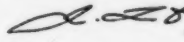
With respect to the study of other metals, let's mention that the iron sector remained relatively stable. Besides, the CRM's pilot plant undertook a project involving the production of magnesium from asbestos residues.

The CRM's expertise in the field of process control began to benefit the mining and metallurgical industries in 1988-1989. Services offered in mining technology were re-evaluated in order to further the medium-term technological development of companies rather than the sole realization of engineering projects. The new approach will not hamper the CRM's ability to meet the concrete needs of the industry, but it will allow it to increase its scientific output. (The first results of the re-evaluation will be known next year.)

The CRM's management also gave considerable attention to the redistribution of resources as well as to the development of programs in the fields of industrial mineral processing and mining environment.

The CRM's objectives for 1988-1989, set after consultation with the industry, have been achieved. Special thanks must go to our employees, and to the industry people who offered much sound advice and who assisted us in the choice of research projects.

Director general of the
Centre de recherches minérales



Jacques Saint-Cyr

Sainte-Foy, April 25, 1989.

MANDATE OF THE CRM

The CRM was constituted by an Order in Council in 1969. An essential component of the MER's Mines sector, the CRM resulted from the merger of existing laboratories and the pilot plant. Its objective is to provide scientific and technical support for the exploration, development, processing and use of Québec's mineral resources. Part of the CRM's mandate is to foster cooperation and coordination in mineral research.

With the numerous resources at its disposal the CRM is able to play an important role in applied research with respect to both mining operations and ore processing. Industry initiatives receive support from the CRM in the form of technical and scientific assistance. The CRM's client-sponsored projects are carried out directly on behalf of the industry and its internal projects benefit the industry indirectly. Its fields of activity include mineral analysis, metallurgy, ore dressing and mining technology.

MAIN TECHNOLOGICAL CONTRIBUTIONS TO THE MINING AND METALLURGY SECTOR

The CRM and Mineral Analysis
In the field of mineral analysis, the CRM handles all internal requests from its own laboratories and pilot plant, as well as those from the Direction générale de l'exploration géologique et minérale (DGEGM). The CRM's analyses are used by the DGEGM to carry out studies on Québec's geology and mineral potential. The analyses are also available to the other partners in the mining and mineral sectors.

In 1988-1989, the CRM analyzed almost 45,000 samples for some 900,000 determinations at a cost of $ 1.5 million. Furthermore, the CRM awarded mineral analysis contracts totalling $ 127,000 to commercial and university laboratories.

Several projects in analytical research were sponsored by the industry. In some cases, the CRM acted as a technological transfer agent to the industry through technical training programs, optimization of major analysis systems, and development of computerized data management systems. Various client-sponsored studies were also undertaken in the

field of applied mineralogy. These studies focussed mainly on iron and gold ores.

The CRM also gained sampling expertise in the course of the year. In the direct analysis of alloys, the technique of direct solids atomization looks promising. Image processing analysis was used in a number of applications for iron ore, gold ore, industrial minerals, fine particles and process control.

Robotics also made its appearance in the CRM's laboratories. A research team set up a pilot project to automate certain operations in neutron activation.

The CRM and Ore Dressing
The CRM carried out more than 200 ore-dressing projects in 1988-1989, with a total value of $ 3.8 million. This performance is comparable to that of last year. The projects focussed on industrial minerals (40 %), precious metals ore (23 %), and iron ore (17 %). Companies participated in 70 % of the projects.

With respect to industrial minerals, the CRM worked extensively with graphite and magnesium ores. The development of new and highly promising applications has stimulated a good deal of interest in flaked graphite. The CRM also participated in the Magnola project, which is aimed at producing magnesium in metallic form using asbestos waste from the Thetford-Mines region. As well, an agreement signed with the CRIQ will pool the expertise of both organizations, with a view to better supporting the efforts of Québec companies as they attempt to give added value to their products. This is directed mainly to those involved in the plastics sector.

Junior exploration companies found it increasingly difficult to secure sufficient financing in 1988-1989, a fact which produced a slow-down in the precious metals sector. Nonetheless, several studies on treatment processes were carried out on the ores of the Abitibi-Témiscamingue region.

The CRM's carried out some work on behalf of three producers in Labrador and Québec. The main objective of this work was the development of a technique for the production of more specialized pellets such as self-fluxing pellets and pellets for direct reduction. By developing appropriate tests, the CRM will be able to collaborate more effectively with the industry in the development of pellets that are better suited to direct reduction.

The CRM's objective in the area of process control is to help the industry improve the productivity of processing plants through the use of modern techniques related to computer technology. Progress in this area has been remarkable over the past year. Several projects have been completed in various fields which have significantly improved quality and production control.

The CRM and Mining Technology
The CRM's personnel includes a team of experts in the field of mining technology. This team provides the mining and mineral industries with technical support in industrial engineering, ground control and computer technology applied to mining.

Demand for client-sponsored projects in this area is increasing. In 1988-1989, the CRM completed 45 such projects with an average value of $ 15,573. The CRM sees this growth as mark of industry confidence.

The CRM continued to publish practical engineering guides in 1988-1989, an activity that began in 1986 with the publication of the *Guide d'ingénierie pour les piliers de surface*. This was followed in 1987 by the highly successful *Guide d'utilisation du boulonnage*, which is now available from CANMET in an English version. The 1987 guide was used by a French firm to develop a new expert system in rock bolting that will be made available to Québec companies in 1989. Two other guides have also been published: the *Guide condensé d'utilisation du boulonnage* and the *Guide d'ingénierie des remblais dans les mines souterraines*.

Although consulting firms have generally made up the bulk of the CRM's clientele in the field of computer-assisted engineering, this year saw a growing demand from exploration companies. The CRM's R&D team in computer technology provides these companies with the technical support they need to improve their efficiency and competitiveness in an everchanging market. Certain projects required the participation of the CRM's multidisciplinary teams which group specialists in analysis, process development, rock mechanics and planning. The results of these projects were integrated in a unique data base used to perfect optimal methods of mine development.

A team of professionals also carried out standard assays in the rock mechanics laboratory on behalf of companies with an interest in granite quarries. These tests produced valuable data that were subsequently used in a variety of other studies. The high quality and the efficiency of its work make this laboratory an important tool for Québec's mining sector.

The CRM must keep abreast of the latest technological developments and foster « pre-competitive » research. Last year, for instance, almost 30 % of its mineral technology budget was used to acquire new expertise. By awarding them research contracts in the fields of robotics, production, safety, and the environment, the CRM has benefitted from the universities' contribution. This kind of cooperation is essential for Québec's technological progress.

The CRM and the Mine Environment Neutral Drainage Program (MEND)
The CRM has representatives on the general and technical committees of the national MEND Program. As part of this program, the CRM is setting up an ambitious research project concerning acid mine drainage of sulfurous waste sites whether abandoned or in use. Planning and organization of the R&D work involved took place in 1988-1989; the work itself will begin in 1989-1990 and continue for five years.

The CRM and Vein-type Ore Bodies
For the moment, in 40 % of the deposits mined in Québec, ore must be extracted from narrow veins (less than 2 metres thick). In the present situation, a number of known deposits cannot be profitably mined using conventional techniques. To solve this problem, the CRM is undertaking a major research program on vein-type ore bodies in collaboration with Université Laval and the AMQ. In February and March of 1989, a study was carried out to characterize these deposits and identify the main problems associated with their mining. The results of the study will be known in the fall of 1989.

REVENUES AND EXPENDITURES OF THE CRM (1986-1989)

(In thousands of $)	1986-1987	1987-1988	1988-1989
BUDGET	7,489.5	7,575.7	8,158.3
EXPENDITURES			
OPERATIONS	6,377.9	6,865.4	7,300.0*
CAPITAL	853.6	585.1	700.0*
TOTAL EXPENDITURES	7,231.5	7,450.5	8,000,0*
REVENUES	967.6	1,219.7	1,633.4

* These data are subject to change.

CLIENT-SPONSORED PROJECTS NUMBER COMPLETED AND VALUE (1986-1989)

(In thousands of $)	1986-1987	1987-1988	1988-1989
NUMBER	133	192	231
VALUE	3,405.7	2,974.6	3,555.5

This year, the CRM completed 231 client-sponsored projects valued at $ 3.55 million. This is an increase over last year's figures: 192 projects valued at $ 2.97 million.

Approximately 50 % of the projects were valued at less than $ 5,000; 22 % cost between $ 10,000 and $ 25,000; 14 % between $ 5,000 and $ 10,000; 9 % between $ 25,000 and $ 50,000; and 6 % between $ 50,000 and $ 100,000. Only one project was valued at more than $ 100,000.

The value of client-sponsored projects accepted in 1988-1989 reached $ 4.456 million. Exploration companies accounted for 26.5 % of these projects, mining companies for 52 %, mineral processing companies for 11.4 %, and service companies for 10.1 %.

OUTLOOK FOR 1989-1990

In the year ahead, the CRM will again concentrate its activities on three main areas: mineral analysis, ore dressing and mining technology.

In mineral analysis, actual laboratory analysis will make the bulk of the CRM's work (about 70 %), with the other 30 % being devoted to analytical research, applied mineralogy, and computer technology applied to the laboratory. The relative importance of mineralogy is expected to grow since new applications are being studied for granulats and polymetallic sulphurs, among others.

Pursuant to the industrial waste-reduction program of the ministère de l'Environnement, the CRM is planning to assist the industry in characterizing and controling waste material and in obtaining ministerial accreditation of its laboratories.

The CRM also expects a much higher industry demand for its services in the field of process control. In the longer term, the CRM is planning to complete four research projects in collaboration with the federal government. This will be done under the technology section added to the Canada-Québec Subsidiary Agreement on Mineral Development (SAMD).

These projects focus on expanded graphite, ore processing of rare earths, improved productivity of gold ore processing plants and of hematite recovery during iron ore concentration using spirals. The CRM also intends to advise the industry on treatment processes that are less harmful to the environment.

The addition of a technology section to the SAMD will have a marked effect on the CRM's research program in mining technology. It will enable the center to bring more technological know-how to its client-sponsored projects, and to better meet the needs of Québec's mining industry in the years ahead.

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